Chapter 11
Induced Damage Models - Hazardous Materials Release

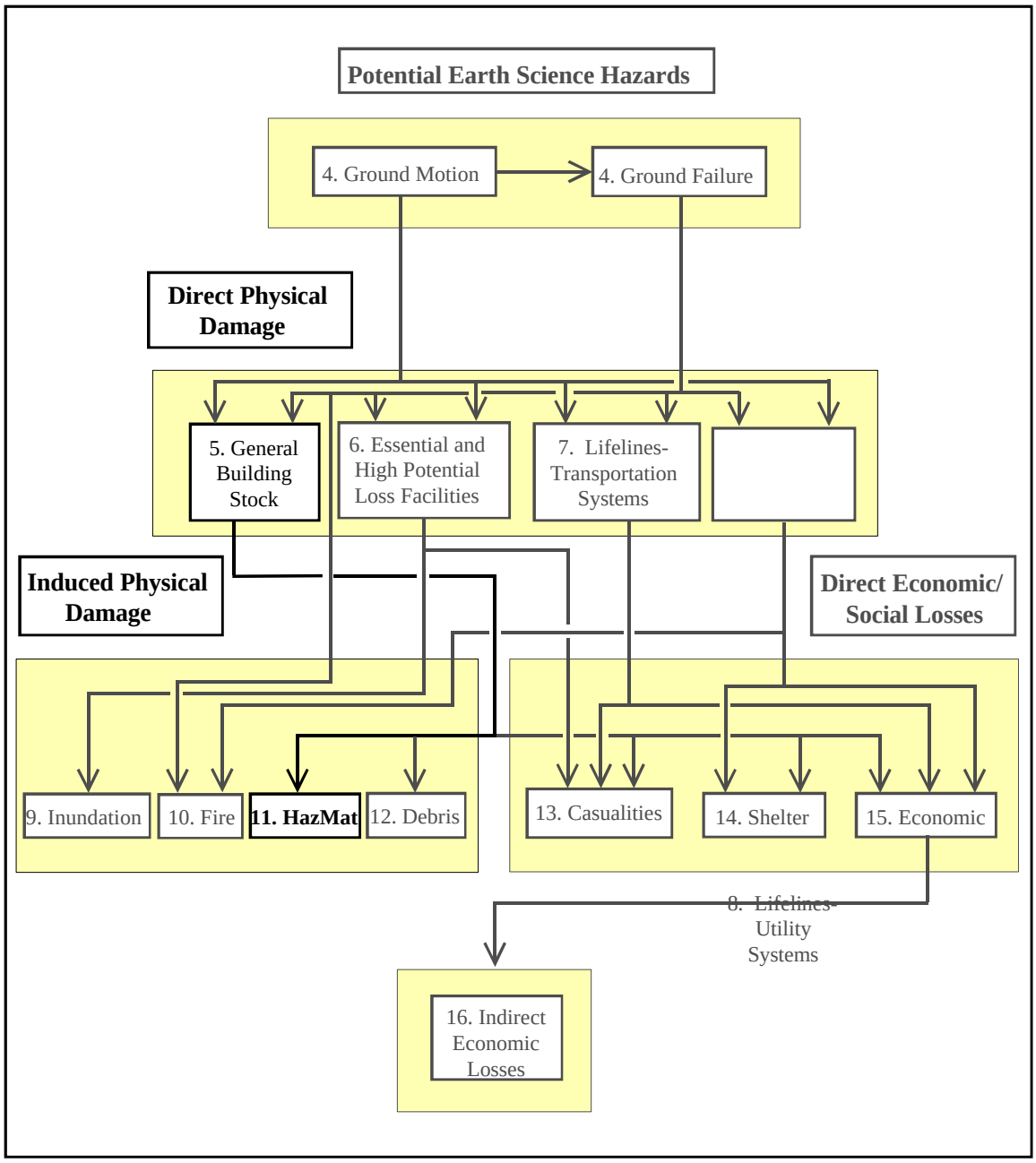
11.1 Introduction

Hazardous materials are those chemicals, reagents or substances that exhibit physical or health hazards, whether the materials are in a usable or waste state. The scale, and hence the consequences, of hazardous materials releases can vary from very small, such as a gallon of paint falling off of shelves, to regional, such as release of toxic chemicals from a processing plant. Most hazardous materials incidents have immediately led to human casualties only in cases where explosions have occurred. Non-explosive hazardous materials incidents, which comprise the vast majority, typically have led to contamination of the environment and temporary health consequences to human beings. Hazardous materials releases can also lead to fires. With specific reference to earthquake caused hazardous materials incidents, the data thus far indicate that there have been no human casualties. The consequences of these incidents have been fires and contamination of the environment, and have led to economic impacts because of the response and clean-up requirements. The methodology highlighting the Hazardous Materials Release component is shown in Flowchart 11.1.

11.1.1 Scope

This loss estimation methodology has been restricted to identifying the location of facilities that contain hazardous material which could lead to a significant immediate demand on health care and emergency response facilities. These types of incidents would include large toxic releases, fires or explosions. Thus, the default database of hazardous material facilites is limited to facilities where large quantities of chemicals that are considered highly toxic, flammable or highly explosive are stored. Estimates of releases that could cause pollution of the environment and the need for long-term clean-up effects are beyond the scope of this methodology.

An exhaustive search of the existing literature for models that can be utilized to predict the likelihood of occurrence of hazardous materials releases during earthquakes was conducted at the beginning of this study. Unfortunately, no directly usable models were found. There were three attempts at modeling that had been made previously (Tierney, et al., 1990, Ravindra, 1992, Los Angeles County Fire Department, 1992). The model developed by Tierney et al. focused on the likelihood of gaseous releases, and its potential effect on surrounding populations. However, it was not found to be suitable for risk assessment efforts by local jurisdiction personnel due to the level of detailed analysis required. The study conducted by Ravindra is in essence identical to the effort by the Los Angeles County Fire Department. This effort is really intended for seismic vulnerability analysis of individual facilities, and requires significant expert input,



Flowchart 11.1: Hazardous Materials Release Relationship to other Modules in the Earthquake Loss Estimation Methodology

including a walk-through inspection. Furthermore, this effort is aimed at large complexes similar to petrochemical facilities, and is not suitable for a more general application. There is, therefore, the need for a more general model that can be used by emergency preparedness officials at the local jurisdiction level so that they can determine the potential for hazardous materials incidents occurring during earthquakes.

Due to the limitations of state-of-the-art hazardous materials release models, this module is restricted to establishing a standardized approach for classifying materials and developing a good database that can be used by local planners to identify those facilities that may be most likely to have significant releases in future earthquakes. A default database of potential sites is provided from an EPA database of hazardous materials sites. This database can be supplemented by the user with local information. A more detailed vulnerability assessment would involve going to individual facilities to determine how chemicals are stored, the vulnerability of buildings and storage tanks and other relevant information.

11.1.2 Classification of Hazardous Materials

The most widely used detailed classification scheme is the one that has been developed by the National Fire Protection Association, and is presented in the 1991 Uniform Fire Code, among other documents. This classification scheme is shown in Table 11.1. The hazards posed by the various materials are divided into two major categories: Physical Hazards and Health Hazards. Depending upon the exact nature of the hazard, these two major categories are divided into subcategories. These subcategories of hazards, with their definitions, and examples of materials that fall within each category, are contained in Appendix 11A and 11B. A more detailed description of these categories, with more extensive examples can be found in Appendix VI-A of the 1991 Uniform Fire Code. Table 11.1 also contains minimum quantities of the materials that must be on site to require permitting according to the Uniform Fire Code. It should be noted that the minimum permit quantities might vary depending upon whether the chemical is stored inside or outside of a building.

11.1.3 Input Requirements and Output Information

The input to this module is essentially a listing of the locations of facilities storing hazardous materials and the types/amounts of the materials stored at the facility. Facilities need only be identified if they use, store or handle quantities of hazardous materials in excess of the quantities listed in Table 11.1. Other facilities that may have hazardous materials, but in quantities less than those listed in Table 11.1 should not be included in the database because it is anticipated that releases of these small quantities will not put significant immediate demands on health and emergency services. However, the user may choose to modify threshold amounts in building the database.

Table 11.1: Classification of Hazardous Materials and Permit Amounts

Label	Material Type	Permit Amount		Hazard Type & Remarks
		Inside Building	Outside Building	
HM01	Carcinogens	10 lbs	10 lbs	Health
HM02	Cellulose nitrate	25 lbs	25 lbs	Physical
HM03	Combustible fibers	100 cubic ft	100 cubic ft	Physical
	Combustible liquids			Physical
HM04	Class I	5 gallons	10 gallons	
HM05	Class II	25 gallons	60 gallons	
HM06	Class III-A	25 gallons	60 gallons	
HM07	Corrosive gases	Any amount	Any amount	Health [1]
HM08	Corrosive liquids	55 gallons	55 gallons	Physical; Health
	Cryogens			
HM09	Corrosive	1 gallon	1 gallon	Health
HM10	Flammable	1 gallon	60 gallons	Physical
HM11	Highly toxic	1 gallon	1 gallon	Health
HM12	Nonflammable	60 gallons	500 gallons	Physical
HM13	Oxidizer (including oxygen)	50 gallons	50 gallons	Physical
HM14	Highly toxic gases	Any amount	Any amount	Health; [1]
HM15	Highly toxic liquids & solids	Any amount	Any amount	Health
HM16	Inert	6,000 cubic ft	6,000 cubic ft	Physical; [1]
HM17	Irritant liquids	55 gallons	55 gallons	Health
HM18	Irritant solids	500 lbs	500 lbs	Health
HM19	Liquefied petroleum gases	> 125 gallons	> 125 gallons	Physical
HM20	Magnesium	10 lbs	10 lbs	Physical
HM21	Nitrate film	(Unclear)	(Unclear)	Health
HM22	Oxidizing gases (including oxygen)	500 cubic feet	500 cubic feet	Physical [1]
	Oxidizing liquids			Physical
HM23	Class 4	Any amount	Any amount	
HM24	Class 3	1 gallon	1 gallon	
HM25	Class 2	10 gallons	10 gallons	
HM26	Class 1	55 gallons	55 gallons	
	Oxidizing solids			Physical
HM27	Class 4	Any amount	Any amount	
HM28	Class 3	10 lbs	10 lbs	
HM29	Class 2	100 lbs	100 lbs	
HM30	Class 1	500 lbs	500 lbs	
	Organic peroxide liquids and solids			Physical
HM31	Class I	Any amount	Any amount	
HM32	Class II	Any amount	Any amount	
HM33	Class III	10 lbs	10 lbs	
HM34	Class IV	20 lbs	20 lbs	
	Other health hazards			Health
HM35	Liquids	55 gallons	55 gallons	
HM36	Solids	500 lbs	500 lbs	

Table 11.1: Classification of Hazardous Materials and Permit Amounts (cont.)

Label	Material Type	Permit Amount		Hazard Type & Remarks
		Inside Building	Outside Building	
HM37	Pyrophoric gases	Any amount	Any amount	Physical [1]
HM38	Pyrophoric liquids	Any amount	Any amount	Physical
HM39	Pyrophoric solids	Any amount	Any amount	Physical
HM40	Radioactive materials	1 m Curie in unsealed source	1 m Curie in sealed source	Health [1]
HM41	Sensitizer, liquids	55 gallons	55 gallons	Health
HM42	Sensitizer, solids	500 lbs	500 lbs	Health
HM43	Toxic gases	Any amount	Any amount	Health [1]
HM44	Toxic liquids	50 gallons	50 gallons	Health
HM45	Toxic solids	500 lbs	500 lbs	Health
HM46	Unstable gases (reactive)	Any amount	Any amount	Physical [1]
	Unstable liquids (reactive)			Physical
HM47	Class 4	Any amount	Any amount	
HM48	Class 3	Any amount	Any amount	
HM49	Class 2	5 gallons	5 gallons	
HM50	Class 1	10 gallons	10 gallons	
	Unstable solids (reactive)			Physical
HM51	Class 4	Any amount	Any amount	
HM52	Class 3	Any amount	Any amount	
HM53	Class 2	50 lbs	50 lbs	
HM54	Class 1	100 lbs	100 lbs	
	Water-reactive liquids			Physical
HM55	Class 3	Any amount	Any amount	
HM56	Class 2	5 gallons	5 gallons	
HM57	Class 1	10 gallons	10 gallons	
	Water-reactive solids			Physical
HM58	Class 3	Any amount	Any amount	
HM59	Class 2	50 pounds	50 pounds	
HM60	Class 1	100 pounds	100 pounds	

[1] Includes compressed gases

To build the hazardous materials database for a selected region, the user should attempt to gather the following information:

- Name of Facility or Name of Company
- Street Address
- City
- County
- State
- Zip Code
- Name of Contact in Company
- Phone Number of Contact in Company
- Standard Industrial Classification (SIC) Code
- Chemical Abstracts Service (CAS) Registry Number
- Chemical Name

- Chemical Quantity
- Hazardous Material Class (From Table 11.1)
- Latitude and Longitude of Facility

The Chemical Abstracts Service (CAS) registry number is a numeric designation assigned by the American Chemical Society's Chemical Abstracts Service and uniquely identifies a specific chemical compound. This entry allows one to conclusively identify a material regardless of the name or naming system used. To obtain this data the user must identify the local agency with which users of hazardous materials must file for permits. Based upon current understanding of the process, this local agency would be the Fire Department for incorporated areas, and the County Health Department for unincorporated areas. The user may opt to use only the information contained in a modified version of the EPA-TRI Database that is provided in the methodology. This database, however, is limited and the user is urged to collect additional inventory.

The output of this module is essentially a database that can be sorted according to any of the fields listed above. It can be displayed on a map and overlaid with other maps.

11.2 Description of Methodology

The analysis here is divided into three levels, as described below:

- Default Analysis: Listing of all facilities housing hazardous materials that are contained in the default hazardous materials database.
- User-Supplied Data Analysis: Listing of all facilities housing hazardous materials that are contained in the default hazardous materials database and refined by the user with locally available information.
- Advanced Data and Models Analysis: Detailed risk assessment for individual facilities, including expert-generated estimates.

11.3 Guidance for Expert-Generated Estimates

A detailed analysis is quite involved and is intended to provide the user with a relatively good estimate of the likelihood of a hazardous materials incident occurring at individual facilities during an earthquake. The detailed analysis therefore provides vulnerabilities of individual facilities. While the model were based primarily on location of facilities and type(s) and quantities of hazardous materials on site, a more detailed analysis is intended to take into account a number of other factors including the level of preparedness of individual facilities and the type of structure within which the hazardous materials are located. To do this detailed analysis, it is necessary to have an expert conduct a detailed analysis of individual facilities.

The level of sophistication to be attained in an analysis can vary significantly, depending upon how the analysis is defined. It is recommended very strongly that the user clearly

identify the purpose and scope of the analysis first before engaging an expert to conduct the analysis. Based on the level of analysis expected, the user then has to identify and select an expert, or several experts, to conduct the analysis. In any case, it will be necessary for the expert(s) to conduct a thorough survey and inspection of the facilities. The areas that need to be covered include the following: structures, building contents including equipment, storage areas, tanks, and emergency preparedness. Depending upon the level of the analysis, the experts required could cover the following: a hazardous materials expert, a structural engineer, an emergency planner, and a mechanical engineer. The role(s) each of these experts would play is explained below.

Input Requirements

The most elementary form of detailed analysis would consist of a hazardous materials expert doing a walk through to identify target hazard areas. In most jurisdictions, the fire department personnel are the best trained in issues pertaining to hazardous materials. Many fire departments are also willing to meet with major users of hazardous materials to do what is termed "pre-planning". In this effort, fire departments visit the facilities of users, identify areas that they think are particularly vulnerable, and suggest improvements. If there were code violations, the fire department personnel would point this out. In highly industrialized areas, there are consulting firms that are capable of conducting this assessment. The smaller consulting firms tend to be comprised only of individuals with expertise in hazardous materials issues.

It must be borne in mind that when assessing the potential for hazardous materials releases during earthquakes, the performance of the structure and the performance of nonstructural items are both important. Another very important factor is the level of preparedness, especially where it pertains to the ability to contain an incident and prevent it from spreading or enlarging.

The structural and nonstructural vulnerability of a hazardous materials facility are assessed by a qualified structural engineer. For example, the integrity of an above ground storage tank, containing 100,000 gallons of petroleum, should be evaluated by a structural engineer.

A large number of hazardous materials incidents during earthquakes have occurred at locations where the structure itself suffered no damage. This has been due to the manner in which the hazardous materials are stored and used within the buildings or structures. Generally, it is the extent to which nonstructural hazard mitigation measures have been implemented that determines the vulnerability of the contents. At the present time there is no profession that specializes in "nonstructural engineering". A reference on nonstructural hazard mitigation measures has been written by Reitherman (1983). A more specific paper discussing hazard prevention techniques in the laboratory has been written by Selvaduray (1989). Though not directly pertaining to industrial facilities, FEMA has developed a guide for nonstructural hazard mitigation in hospitals (FEMA, 1989). Hazard mitigation strategies, particularly where they pertain to preventing toxic

gas releases during earthquakes, have been studied by ABAG, and are contained in a special report prepared by ABAG (1991).

In conducting a detailed analysis, it is important not only to assess the potential for occurrence of incidents, but it is also important to assess the capability of containing incidents and preventing them from spreading or becoming enlarged. The level of preparedness of the individual facilities generally determines this. There have been a number of cases where the incidents would have been smaller than they actually were, had the organization/facility had the capability to respond in a timely manner. The type of expert needed here is an "Emergency Planner". Unfortunately, it is not easy to find an emergency planner who specializes in assessing individual facilities. Here again, perhaps the most qualified and educated personnel are fire department personnel. In most cases, hazardous materials consultants also address issues pertaining to response. In the case when an expert is not available, the document by the U.S. Environmental Protection Agency (EPA, 1987), which provides technical guidance for hazards analysis and emergency planning for extremely hazardous substances is an excellent guide. Another useful guide is the "Hazardous Materials Emergency Response Guide" published by the National Response Team (1987). The user should keep in mind that both of these documents are quite general in nature, and do not address earthquake concerns specifically. Nevertheless, in the absence of more specific information, these guides are definitely useful in getting the user started towards assessing the risks.

Depending upon the type of facility, there could also be a large number of mechanical systems, including piping that either utilize or carry hazardous materials. Examples of such facilities include petroleum refineries, semiconductor processing facilities, and polymer resin synthesis facilities. In such cases, the type of expert capable of conducting an adequate vulnerability analysis of the mechanical and piping systems would be a mechanical engineer. It should be pointed out that mechanical engineering is a very broad field, and the particular type of mechanical engineer who would be suitable for a task such as the one posed here would be one with a very strong background in plant safety, and preferably also in structural analysis. A number of hazardous materials releases during past earthquakes have occurred in mechanical and piping systems. This component should therefore not be ignored. A book on assessing the earthquake vulnerability of building equipment has been written by McGavin (1983). This book provides particularly valuable information on anchoring of equipment. One approach to assessing the vulnerability of hazardous materials piping systems has been developed and presented by Kircher (1990), and can potentially be utilized by mechanical engineers having the capability to conduct particularly sophisticated analysis.

There are two documents that provide a general methodology for assessing the earthquake vulnerability of entire facilities, particularly those that contain hazardous materials. One such document is the "Proposed Guidance for RMPP Seismic Assessments" contained within the Los Angeles County Fire Department's Risk Management and Prevention Program Guidelines. This document provides guidelines for assessing the earthquake vulnerability of facilities that use hazardous materials, especially Acutely Hazardous

Materials (AHM). However, the methodology provided does require a structural engineer. On the positive side, there are relatively detailed guidelines for assessing the vulnerability of piping systems. Ravindra (1992) has presented an approach, that is very similar to the one developed by the Los Angeles County Fire Department, for seismic evaluation of hazardous materials facilities.

Output Information

Ideally, upon completion of a detailed analysis, the user will have a very good idea of the vulnerability (ies) contained within each facility. The user will have a relatively good grasp of the potential for occurrence of hazardous materials releases, during earthquakes, at each of the facilities analyzed. While this might not be a quantified probability number, the results of the analysis should provide sufficient information to categorize the likelihood in terms of "high, medium, or low". In addition to the overall likelihood, the user should also be able to identify the locations within each facility where hazardous materials releases might occur. This can be particularly important for larger facilities that cover several acres. It is only by identifying specific locations within the larger facilities that adequate response can be planned for. Another piece of information that the user should obtain from an expert-assisted analysis is the likely consequence of a hazardous materials release. Particularly important here is the scope of the release, and the manner in which it would affect the surrounding area. It is expected that this can be determined by combining the analysis data with other data such as hazard, type of the material, phase of the material (solid, liquid or gas), prevailing weather conditions, and demographics of the surrounding region.

The analysis should also provide the user with the ability to assess the response capability of each facility inspected. Depending upon the response capability that each facility has, the user would need to adjust his/her response capability to account for this. In general, the larger industrial facilities, such as petroleum refineries, tend to have relatively extensive response capability in-house. As such, they would be able to be the "first responders", with the local jurisdictions providing the necessary backup capabilities. On the other hand, if the larger industrial facilities do not have sufficient capabilities to respond to hazardous materials releases, the analysis would provide the local emergency preparedness officials with the opportunity to require such facilities to increase their response capability.

11.4 References

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Appendix 11A
Listing of Chemicals contained in SARA Title III, including their CAS Numbers, Hazards and Treshold Planning Quantities

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
00075-86-5	Acetone cyanohydrin	Poison	1,000
01752-30-3	Acetone thiosemicarbazide	Poison	1,000 +
00107-02-8	Acrolein	Flammable liquid & poison	500
00079-06-1	Acrylamide	Poison	1,000 +
00107-13-1	Acrylonitrile	Flammable liquid & poison	10,000
00814-68-6	Acrylyl chloride	Poison	100
00111-69-3	Adiponitrile	Poison	1,000
00116-06-3	Aldicarb	Deadly poison	100 +
00309-00-2	Aldrin	Poison	500 +
00107-18-6	Allyl alcohol1	Flammable liquid & poison	1,000
00107-11-9	Allylamine	Flammable liquid & poison	500
20859-73-8	Aluminum phosphide	Flammable solid & poison	500
00054-62-6	Aminopterin	Poison	500 +
00078-53-5	Amiton	Deadly poison	500
03734-97-2	Amiton oxalate	Deadly poison	100 +
07664-41-7	Ammonia, anhydrous	Poison	500
00300-62-9	Amphetamine	Deadly poison	1,000
00062-53-3	Aniline	Poison	1,000
00088-05-1	Aniline, 2,4,6-trimethyl	Poison	500
07783-70-2	Antimony pentafluoride	Corrosive to skin, eyes, mucuous membranes	500
01397-94-0	Antimycin A	Poison	1,000 +
00086-88-4	Antu	Poison	500 +
01303-28-2	Arsenic pentoxide	Poison	100 +
01327-53-3	Arsenous oxide	Poison	100
07784-34-1	Arsenous trichloride	Poison	500
07784-42-1	Arsine	Poison gas & flammable gas	100
02642-71-9	Azinphos-ethyl	Poison	100 +
00086-50-0	Azinphos-methyl	Poison	10 +
00098-87-3	Benzal chloride	Moderately toxic	500
00098-16-8	Benzehamine,3-(trifluoromethyl)-	Poison	500
00100-14-1	Benzene, 1-(chloromethyl)-4-nitro-	Poison	500 +
00098-05-5	Benzenearsonic acid	Deadly poison	10 +
03615-21-2	Benzimidazole, 4,5-dichloro-2-(trifluoromethyl)	Poison	500 +
00098-07-7	Benzotrichloride (benzoic trichloride)	Corrosive & poison	100
00100-44-7	Benzyl chloride	Corrosive & poison	500
00140-29-4	Benzyl cynaide	Poison	500
15271-41-7	Bicyclo [2,2,1]heptane-2-carbonitrile,5-chloro-6((((methylamino)carbonyl)oxy)imino)-(1S-(1-alpha,2-beta,4-alpha,5-alpha,6E))-	Poison	500 +
00111-44-4	Bis(2chloroethyl)ether	Poison	10,000
00542-88-1	Bis(chloromethyl)ether	Poison & carcinogen	100
00534-07-6	Bis(chloromethyl)ketone	Poison	10 +
04044-65-9	Bitoscanate	Poison	500 +
10294-34-5	Boron trichloride	Corrosive, poison, irritant & reactive with water	500
07637-07-2	Boron trifluoride	Poison & strong irritant	500
00353-42-4	Borontrifluoride compound with methyl ether (1:1)	Flammable, corrosive & poison	1,000
28772-56-7	Bromadiolone	Deadly poison	100 +
07726-95-6	Bromine	Corrosive & poison	500
01306-19-0	Cadmium oxide	Poison	100 +
02223-93-0	Cadmium stearate	Poison	1,000 +
07778-44-1	Calcium arsenate	Poison & carcinogen	500 +
00056-25-7	Cantharidin	Deadly poison	100 +
00051-83-2	Carbachol chloride	Deadly poison	500 +

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
26419-73-8	Carbamic acid, methyl-O-(((2,4-dimethyl-1,3-dithiolan-2-yl)methylene)amino)-	Poison	100 +
01563-66-2	Carbofuran	Poison	10 +
00075-15-0	Carbon disulfide	Flammable liquid & poison	10,000
000786-19-6	Carbophenothion	Poison	500
00057-74-9	Chlordane	Flammable liquid & poison	1,000
00470-90-6	Chlorfenvinfos	Poison	500
07782-50-5	Chlorine (not muratic acid or bleach)	Poison gas	100
24934-91-6	Chlormephos	Poison	500
00999-81-5	Chlormequat chloride		100 +
00079-11-8	Chloroacetic acid	Corrosive & poison	100 +
00107-07-3	Chloroethanol	Flammable liquid & poison	500
00627-11-2	Chloroethyl chloroformate	Poison	1,000
00555-77-1	Tris(2-chloroethyl)amine	Moderately toxic	100
00067-66-3	Chloroform	Poison	10,000
00107-30-2	Chloromethyl methyl ether	Flammable liquid & poison	100
03691-35-8	Chlorophacinone	Poison	100 +
01982-47-4	Chloroxuron	Poison	500 +
21923-23-9	Chlorthiophos	Poison	500
10025-73-7	Chromic chloride	Poison	1 +
10210-68-1	Cobalt carbonyl	Poison	10 +
62207-76-5	Cobalt,((2,2'-(1,2-ethanediylbis(nitrilomethylidyne))bis(6-fluorophenolato))(2-)-N,N',O,O')-	Poison	100+
00064-86-6	Colchicine	Poison	10 +
00056-72-4	Coumaphos	Poison	100 +
05836-29-3	Coumatetralyl	Poison	500 +
00095-48-7	Othro-cresol	Poison	1,000 +
00535-89-7	Crimidine	Deadly poison	100 +
00123-73-9	Crotonaldehyde	Poison	1,000
04170-30-3	E-crotonaldehyde	Flammable liquid & poison	1,000
00506-68-3	Cyanogen bromide	Poison	500 +
00506-78-5	Cyanogen iodide	Poison	1,000 +
02636-26-2	Cyanophos	Poison	1,000
00675-14-9	Cyanuric fluoride	Poison	1000
00066-81-9	Cycloheximide	Poison	100 +
000108-91-8	Cyclohexylamine	Flammable liquid & poison	10,000
17702-41-9	Decaborane (14)		500 +
08065-48-3	Demeton	Deadly poison	500
00919-86-8	Demeton-s-methyl	Poison	500
10311-84-9	Dialifor	Poison	100 +
19287-45-7	Diborane	Flammable gas & poison	100
00110-57-6	Trans-1,4-dichlorobutene	Poison	500
00149-74-6	Dichloromethylphenylsilane	Flammable liquid & poison	1,000
00062-73-7	Dichlorvos	Poison	1,000
00141-66-2	Dicrotophos	Poison	100
01464-53-5	Diepoxybutane	Poison	500
00814-49-3	Diethyl chlorophosphate	Deadly poison	500
01642-54-2	Diethylcarbamazine citrate	Poison	100+
00071-63-6	Digitoxin	Deadly poison	100+
02238-07-5	Diglycidyl ether	Poison	1,000
20830-75-5	Digoxin	Deadly poison	10+
00115-26-4	Dimefox	Poison	500
00060-51-5	Dimethiate	Poison	500+
06923-22-4	3-(Dimethoxy phosphinyloxy)-N-methyl-cis croton-amide(monocrotophos)	Poison	10
00075-78-5	Dimethyldichlorosilane	Poison & irritant	500
00057-14-7	Dimethylhydrazine	Flammable liquid & poison	1,000
00099-98-9	Dimethyl-p-phenylenediamine	Poison	10+
02524-03-0	Dimethyl phosphochloridothioate	Corrosive & poison	500
00077-78-1	Dimethyl sulfate	Corrosive & poison	500
00644-64-4	Dimetilan	Poison	500+
00534-52-1	4,6-Dinitro-o-cresol	Poison	10+

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
00088-85-7	Dinoseb	Poison	100+
01420-07-1	Dinoterb	Poison	500+
00078-34-2	Dioxathion	Poison	500
00082-66-6	Diphacinone	Poison	10+
00152-16-9	Diphosphoramide, octamethyl	Poison	100
00298-04-4	Disulfoton	Poison	500
00514-73-8	Dithiazamine iodide	Poison	500+
00541-53-7	Dithiobiuret	Poison	100+
00316-42-7	Emetine, dihydrochloride	Poison	1+
00115-29-7	Endosulfan	Poison	10+
02778-04-3	Endothion	Poison	500+
00072-20-8	Endrin	Poison	500+
00106-89-8	Epichlorohydrin	Flammable liquid & poison	1,000
02104-64-5	EPN	Poison	100+
00050-14-6	Ergocalciferol	Poison	1,000+
00379-79-3	Ergotamine tartate	Poison	500+
01622-32-8	Ethanesulfonyl chloride,2-chloro	Poison	500
10140-87-1	Ethanol,1,2-dichloroacetate	Combustible & poison	1,000
00563-12-2	Ethion	Poison	1,000
13194-48-4	Ethoprophos	Poison	1,000
00538-07-8	Ethylbis(2-chloroethyl)amine	Deadly poison	500
00107-15-3	Ethylenediamine	Corrosive, flammable liquid, irritant	10,000
00371-62-0	Ethylene fluorohydrin	Poison	10
00151-56-4	Ethyleneimine	Flammable liquid & poison	500
00075-21-8	Ethylene oxide	Flammable gas & poison	1,000
00542-90-5	Ethylthiocyanate	Poison	10,000
22224-92-6	Fenamiphos	Poison	10+
00122-14-5	Fenitrothion	Poison	500
00115-90-2	Fensulfothion	Poison	500
04301-50-2	Fluenetil	Poison	100+
07782-41-4	Fluorine	Oxidizer & poison	500
00640-19-7	Fluoroacetamide (1061)	Poison	100+
00144-49-0	Fluoroacetic acid	Poison	10+
00359-06-8	Fluoroacetyl chloride	Poison	10
00051-21-8	Fluorouracil	Poison	500+
00944-22-9	Fonofos	Poison	500
00050-00-0	Formaldehyde	Combustible liquid & poison	500
00107-16-4	Formaldehyde cyanohydrin	Poison	1,000
23422-53-9	Formetanate hydrochloride	Poison	500+
02540-82-1	Formothion	Poison	100
17702-57-7	Formparanate	Poison	100+
21548-32-3	Fosthientan	Poison	500
03878-19-1	Fuberidazole	Poison	100+
00110-00-9	Furan	Flammable liquid & poison	500
13450-90-3	Gallium trichloride	Poison	500+
00077-47-4	Hexachlorocyclopentadiene	Corrosive & deadly poison	100
04835-11-4	Hexamethylenediamine,N,N-dibutyl	Poison	500
00302-01-2	Hydrazine	Flammable liquid, corrosive & poison	1,000
00074-90-8	Hydrocyanic acid	Deadly poison	100
07647-01-0	Hydrogen chloride (gas only)	Highly corrosive irritant	500
07664-39-3	Hydrogen fluoride	Corrosive & poison	100
07722-84-1	Hydrogen peroxide (conc. >52%)	Oxidizer, moderately toxic	1,000
07783-07-5	Hydrogen selenide	Flammable gas & deadly poison	10
07783-06-4	Hydrogen sulfide	Flammable gas & poison	500
00123-31-9	Hydroquinone	Poison	500+
13463-40-6	Iron pentacarbonyl	Poison	100
00297-78-9	Isobenzan	Poison	100+
00078-82-0	Isobutyronitrile	Flammable liquid & poison	1,000
00102-36-3	Isocyanic aicd,3,4-dichlorophenyl ester	Poison	500+
00465-73-6	Isodrin	Poison	100+

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
00055-91-4	Isofluorphate	Poison	100
04098-71-9	Isophorone diisocyanate	Poison	100
00108-23-6	Isopropyl chloroformate	Flammable liquid & poison	1,000
00119-38-0	Isopropylmethylpyrazolyl dimethylcarbamate	Poison	500
00078-97-7	Lactonitrile	Poison	1,000
21609-90-5	Leptophos	Poison	500+
00541-25-3	Lewisite	Poison	10
00058-89-9	Lindane	Poison	1,000+
07580-67-8	Lithium hydride	Flammable solid & poison	100
00109-77-3	Malononitrile	Poison	500+
12108-13-3	Mangenese tricarbonyl methylcyclopentadienyl	Poison	100
00950-10-7	Mephosfolan	Poison	500
01600-27-7	Mercuric acetate	Poison	500+
07487-94-7	Mercuric chloride	Poison	500+
21908-53-2	Mercuric oxide	Powerful oxidant	500+
10476-95-6	Methacrolein diacetate	Poison	1,000
00760-93-0	Methacrylic anhydride	Poison	500
00126-98-7	Methylacrylonitrile	Poison	500
00920-46-7	Methacryloyl chloride	Poison	100
30674-80-7	Methacryloyloxyethylisocyanate	Poison	100
10265-92-6	Methamidophos	Poison	100+
00558-25-8	Methanesulfonyl fluoride	Poison	1,000
00950-37-8	Methidathion	Poison	500+
02032-65-7	Methiocarb	Poison	500+
16752-77-5	Methomyl	Poison	500+
00151-38-2	Methoxyethylmercuric acetate	Poison	500+
00074-83-9	Methyl bromide	Poison gas	1,000
00080-63-7	Methyl 2-chloroacrylate	Moderately toxic	500
00079-22-1	Methyl chloroformate	Flammable liquid, corrosive & poison	500
00060-34-4	Methyl hydrazine	Flammable liquid, corrosive, poison	500
00624-83-9	Methyl isocyanate	Flammable liquid & poison	500
00556-61-6	Methyl isothiocyanate	Flammable liquid & poison	500
00074-93-1	Methyl mercaptan	Flammable gas & poison	500
00502-39-6	Methylmercuric dicyanamide	Poison	500+
03735-23-7	Methyl phenkapton	Poison	500
00676-97-1	Methyl phosphonic dichloride	Corrosive & poison	100
00556-64-9	Methyl thiocyanate	Poison	10,000
00075-79-6	Methyl trichlorosilane	Flammable liquid, corrosive & poison	500
00079-84-4	Methyl vinyl ketone		10
01129-41-5	Metolcarb	Poison	100+
07786-34-7	Mevinphos	Poison	500
00315-18-4	Mexacarbate	Poison	500+
00050-07-7	Mitomycin C	Poison	500+
06923-22-4	Monocrotophos	Poison	10+
02763-96-4	Muscinol	Poison	10,000
00505-60-2	Mustard gas	Poison	500
13463-39-3	Nickel carbonyl	Flammable liquid & poison	1
00054-11-5	Nicotine	Poison	100
00065-30-5	Nicotine sulfate	Poison	100+
07697-37-2	Nitric acid (.40% pure)	Corrosive, oxidizer & poison	1,000
10102-43-9	Nitric oxide	Poison gas	100
00098-95-3	Nitrobenzene	Poison	10,000
01122-60-7	Nitrocyclohexane	Poison	500
10102-44-0	Nitrogen dioxide	Oxidizer & moderately toxic	100
00051-75-2	Nitrogen mostard	Deadly poison	10
00062-75-9	N-Nitrosodimethylamine	Poison	1,000
00991-42-4	Norbormide	Poison	100+
PMN-82-147	Organorhodium complex	Flammable & toxic	10+
00630-60-4	Ouabain	Poison	100+
23135-22-0	Oxamyl	Poison	100+

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
00078-71-7	Oxetane,3,3,-bis(chloromethyl)-	Poison	500
02497-07-6	Oxydisulfoton	Poison	500
10028-15-6	Ozone	Poison	100
01910-42-5	Paraquat	Poison	10+
02074-50-2	Paraquat methosulfate	Poison	10+
00056-38-2	Parathion	Poison	100
00298-00-0	Parathion-methyl	Poison	100+
13002-03-8	Paris green	Poison	500+
19624-22-7	Pentaborane	Flammable liquid & poison	500
02570-26-5	Pentadecylamine	Poison	100+
00079-21-0	Peracetic acid	Corrosive & poison	500
00594-42-3	Perchloromethylmercaptan	Poison	500
00108-95-2	Phenol	Poison	500+
04418-66-0	Phenol,2,2-thiobis(4-chloro-6-methyl)	Poison	100+
00064-00-6	Phenol,3-(1-methylethyl)-methylcarbamate	Poison	500+
00058-36-6	Phenoarsazine 10,10-oxydi-	Poison	500+
00696-28-6	Phenyl dichloroarsine	Poison	500
00059-88-1	Phenylhydrazine hydrochloride	Poison	1,000+
00062-38-4	Phenylmercury acetate	Poison	500+
02097-19-0	Phenylsilatrane	Poison	100+
00103-85-5	Phenylthiourea	Poison	100+
00298-02-2	Phorate	Poison	10
04104-14-7	Phosacetim	Poison	100+
00947-02-4	Phosfolan	Poison	100+
00075-44-5	Phosgene	Poison gas	10
00732-11-6	Phosmet	Poison	10+
13171-21-6	Phosphamidon	Poison	100
07803-51-2	Phosphine	Flammable & poison gas	500
02665-30-7	Phosphonothioic acid, methyl-o-(4-nitrophenol)o-phenyl ester	Poison	500
50782-69-9	Phosphonothioic acid, methyl-s-(2-(bis(1-methylethyl)amino)o-ethyl ester`	Poison	100
02703-13-1	Phosphonothioic acid methyl,-o-ethyl-o-4-(methylthio)phenyl ester	Deadly poison	500
03254-63-5	Phosphoric acid, dimethyl,4-(mehtylthio)phenyl ester	Poison	500
02587-90-8	Phosphorothioic aicd,o,o-dimethyl-s-(2-methyl-thio-ethyl ester	Poison	500
07723-14-0	Phosphorus	Flammable solid & poison	100
10025-87-3	Phosphorus oxychloride	Corrosive, irritant & poison	500
10026-13-8	Phosphorus pentachloride	Corrosive & poison	500
01314-56-3	Phosphorus pentoxide	Corrosive & poison	10
07719-12-2	Phosphorus trichloride	Corrosive & poison	1,000
00057-47-6	Physostigmine	Poison	100+
00057-64-7	Physostigmine, salicylate (1:1)	Poison	100+
00124-87-8	Picrotoxin	Poison	500+
00110-89-4	Piperidine	Poison	1,000
23505-41-1	Pirimifos-ethyl	Poison	1,000
10124-50-2	Potassium arsenite	Poison	500+
00151-50-8	Potassium cyanide	Deadly poison	100
00506-61-6	Potassium silver cyanide	Poison & irritant	500
02631-37-0	Promecarb	Poison	500+
00106-96-7	Propagyl bromide	Flammable liquid & deadly poison	10
00057-57-8	beta-Propiolactone	Poison	500
00107-12-0	Propionitrile	Flammable liquid & poison	500
00542-76-7	Propionitrile, 3-chloro	Poison	1,000
00070-69-9	Propiophenone,4-amino	Poison	100+
00109-61-5	Propyl chloroformate	Flammable liquid, corrosive & poison	500
00075-56-9	Propylene oxide	Flammable liquid & poison	10,000
00075-55-8	Propyleneimene	Flammable liquid & poison	10,000
02275-18-5	Prothoate	Poison	100+
00129-00-0	Pyrene	Poison	1,000+

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
00140-76-1	Pyridine,2-methyl-5-vinyl	Poison	500
00504-24-5	Pyridine,4-amino	Poison	500+
01124-33-0	Pyridine,4-nitro-,1-oxide	Poison	500+
53558-25-1	Pyriminil	Poison	100+
14167-18-1	Salcomine	Poison	500+
00107-44-8	Sarin	Deadly poison	10
07783-00-8	Selenous acid	Poison	1,000+
07791-23-3	Selenium oxychloride	Poison	500
00563-41-7	Semicarbazide hydrochloride	Poison	1,000+
03037-72-7	Silane, (4-aminobutyl)diethoxymethyl	Poison	1,000
07631-89-2	Sodium arsenate	Poison	1,000+
07784-46-5	Sodium arsenite	Deadly poison	500+
26628-22-8	Sodium azide	Poison	500
00124-65-2	Sodium cacodylate	Poison	100+
00143-33-9	Sodium cyanide	Deadly poison	100
00062-74-8	Sodium fluoroacetate	Deadly poison	10+
13410-01-0	Sodium selenate	Poison	100+
10102-18-8	Sodium selenite	Poison	100+
10102-20-2	Sodium tellurite	Poison	500+
00900-95-8	Stannane, acetoxytriphenyl	Poison	500+
00057-24-9	Strychnine	Poison	100+
00060-41-3	Strychnine, sulfate	Poison	100+
03689-24-5	Sulfotep	Poison	500
03569-57-1	Sulfoxide,3-chloropropyloctyl	Poison	500
07446-09-5	Sulfur dioxide	Poison gas	500
07783-60-0	Sulfur tetrafluoride	Poison gas	100
07446-11-9	Sulfur trioxide	Corrosive & poison	100
07664-93-9	Sulfuric acid (>93%)	Corrosive & poison	1,000
00077-81-6	Tabun	Poison	10
13494-80-9	Tellurium	Poison	500+
07783-80-4	Tellarium hexafluoride	Poison gas	100
00107-49-3	TEPP	Poison	100
13071-79-9	Terbufos	Deadly poison	100
00078-00-2	Teraethyllead	Flammable liquid & poison	100
00597-64-8	Tetraethyltin	Poison	100
00075-74-1	Tetramethyllead	Poison	100
00509-14-8	Tetranitromethane	Oxidizer & poison	500
10031-59-1	Thallium sulfate	Poison	100+
06533-73-9	Thallous carbonate	Poison	100+
07791-12-0	Thallous chloride	Poison	100+
02757-18-8	Thallous malonate	Poison	100+
07446-18-6	Thallous sulfate	Poison	100+
02231-57-4	Thiocarbazide	Poison	1,000+
39196-18-4	Thiofanox	Poison	100+
00297-97-2	Thioazin	Poison	500
00108-98-5	Thiophenol	Flammable liquid & poison	500
00079-19-6	Thiosemicarbazide	Poison	100+
05344-82-1	Thiourea, (2-chlorophenyl)	Poison	100+
00614-78-8	Thiourea (2-methylphenyl)	Poison	500+
07550-45-0	Titanium tetrachloride	Corrosive & poison	100
00584-84-9	Toluene 2,4-diisocyanate	Poison	500
00091-08-7	Toluene 2,6-diisocyanate	Poison	100
08001-35-2	Toxaphene	Poison	500+
01031-47-6	Triamiphos	Poison	500+
24017-47-8	Triazofos	Poison	500
00076-02-8	Trichloroacetyl chloride	Corrosive & moderately toxic	500
01558-25-4	Trichloro(chloromethyl)silane	Poison	100
27137-85-5	Trichloro(chlorophenyl)silane	Corrosive & poison	500
00115-21-9	Trichloroethylsilane	Flammable liquid & poison	500
00327-98-0	Trichloronate	Poison	500
00098-13-5	Trichlorophenylsilane	Corrosive & poison	500
00998-30-1	Triethoxysilane	Poison	500

CAS Number	Chemical Name	Hazard	Treshold Planning Quantity (pounds)
00075-77-4	Trimethylchlorosilane	Flammable liquid, corrosive & moderately toxic	1,000
00824-11-3	Trimethylolpropane phosphate	Poison	100+
01066-45-1	Trimethyltin chloride	Deadly poison	500+
00639-58-7	Triphenyltin chloride	Poison	500+
02001-95-8	Valinomycin	Poison	1,000+
01314-62-1	Vanadium pentoxide	Poison	100+
00108-05-4	Vinyl acetate monomer	Flammable liquid & moderately toxic	1,000
00081-81-2	Warfarin	Poison	500+
00129-06-6	Warfarin sodium	Poison	100+
28347-13-9	Xylene dichloride	Poison	100+
58270-08-9	Zinc, dichloro(4,4-dimethyl-5((((methylamino)carbonyl)oxino)pentanenitrile)-,(T-4)	Poison	100+
01314-84-7	Zinc phosphide	Flammable solid & poison	500

Note: For the Treshold Planning Quantities marked with a "+", the quantity listed applies only if in powdered form and with a particle size of less than 100 microns, or is handled in solution or molten form, or has a NFPA rating for reactivity of 2, 3 or 4. Otherwise the Treshold Planning Quantity is 10,000 lbs. The material is still required to be reported on an annual inventory at the Treshold Planning Quantity or 500 lbs, whichever is less.

Source of hazard information: N. Irving San and Richard J. Lews, Sr., Dangerous Properties of Industrial Materials, Seventh Edition, Volumes I - III, Van Nostrand Reinhold, New York, (1989).

Appendix 11B
Listing of Chemicals contained in the TRI Database, including their CAS Numbers and Hazards

CAS NUMBER	CHEMICAL NAME	HAZARDS
75-07-0	Acetaldehyde	Poison
60-35-5	Acetamide	Experimental carcinogen
67-64-1	Acetone	Moderately toxic
75-05-8	Acetonitrile	Poison
53-96-3	2-Acetylaminofluorene	Moderately toxic
107-02-8	Acrolein	Poison
79-06-1	Acrylamide	Poison
79-10-7	Acrylic acid	Poison
107-13-1	Acrylonitrile	Poison
309-00-2	Aldrin	Poison
107-05-1	Allyl chloride	Poison
7429-90-5	Aluminum (fume or dust)	Not considered a industrial poison
1344-28-1	Aluminum oxide	Experimental tumorigen
117-79-3	2-Aminoanthraquinone	Experimental carcinogen
60-09-3	4-Aminoazobenzene	Poison
92-67-1	4-Aminobiphenyl	Poison
82-28-0	1-Amino-2-methylanthraquinone	Experimental neoplastigen
7664-41-7	Ammonia	Poison
6484-52-2	Ammonium nitrate (solution)	Powerful oxidizer & an allergen
7783-20-2	Ammonium sulfate (solution)	Moderately toxic
62-53-3	Aniline	Poison
90-04-0	o-Anisidine	Moderately toxic
109-94-9	p-Anisidine	Moderately toxic
134-29-2	o-Anisidine hydrochloride	Experimental carcinogen
120-12-7	Anthracene	Experimental tumorigen
7440-36-0	Antimony	Poison
7440-38-2	Arsenic	Carcinogen
1332-21-4	Asbestos (friable)	Carcinogen
7440-39-3	Barium	Poison
98-87-3	Benzal chloride	Poison
55-21-0	Benzamide	Moderately toxic
71-43-2	Benzene	Poison
92-87-5	Benzidine	Poison
98-07-7	Benzoic trichloride (Benzotrichloride)	Poison
98-88-4	Benzoyl chloride	Carcinogen
94-36-0	Benzoyl peroxide	Poison
100-44-7	Benzyl chloride	Poison
7440-41-7	Beryllium	Deadly poison
92-52-4	Biphenyl	Poison
111-44-4	Bis(2-chloroethyl) ether	Poison
542-88-1	Bis(chloromethyl) ether	Poison
108-60-1	Bis(2-chloro-1-methyulethyl) ether	Poison
103-23-1	Bis(2-ethylhexyl) adipate	Experimental carcinogen
75-25-2	Bromoform (Tribromomethane)	Poison
74-83-9	Bromomethane (methyl bromide)	Poison
106-99-0	1,3-Butadiene	Experimental carcinogen
141-32-2	Butyl acrylate	Moderately toxic
71-36-3	n-Butyl alcohol	Poison
78-92-2	sec-Butyl alcohol	Poison
75-65-0	tert-Butyl alcohol	Moderately toxic
85-68-7	Butyl benzyl phthalate	Moderately toxic
106-88-7	1,2-Butylene oxide	Moderately toxic
123-72-8	Butyraldehyde	Moderately toxic
2650-18-2	C.I. Acid Blue 9, diammonium salt	Poison
3844-45-9	C.I. Acid Blue, disodium salt	Experimental neoplastigen
4680-78-8	C.I. Acid Green 3	Experimental tumorigen
569-64-2	C.I. Basic Green 4	Poison
989-38-8	C.I. Basic Red 1	Poison
1937-37-7	C.I. Direct black 38	Experimental tumorigen
2602-46-2	C.I. Direct Blue 6	Experimental carcinogen

CAS NUMBER	CHEMICAL NAME	HAZARDS
16071-86-6	C.I. Direct Brown 95	Experimental carcinogen
2832-40-8	C.I. Disperse Yellow 3	Experimental tumorigen
3761-53-3	C.I. Food Red 5	
81-88-9	C.I. Food Red 15	Poison
3118-97-6	C.I. Solvent Orange 7	Experimental carcinogen
97-56-3	C.I. Solvent Yellow 3	Experimental carcinogen
842-07-9	C.I. Solvent Yellow 14	Experimental carcinogen
492-80-8	C.I. Solvent Yellow 34 (Auramine)	Poison
128-66-5	C.I. Vat Yellow 4	Experimental carcinogen
7440-43-9	Cadmiun	Poison
156-62-7	Calcium cyanamide	Poison
133-06-2	Captan	Moderately toxic
63-25-2	Carbaryl	Poison
75-15-0	Carbon disulfide	Poison
56-23-5	Carbon tetrachloride	Poison
463-58-1	Carbonyl sulfide	Poison
120-80-9	Catechol	Moderately toxic
133-90-4	Chloramben	Experimental carcinogen
57-74-9	Chlordane	Poison
7782-50-5	Chlorine	Moderately toxic
10049-04-4	Chlorine dioxide	Moderately toxic
79-11-8	Chloroacetic acid	Poison
532-27-4	2-Chloroacetophenone	Poison
108-90-7	Chlorobenzene	Poison
510-15-6	Chlorobenzilate	Experimental carcinogen
75-00-3	Chloroethane	Mildly toxic
67-66-3	Chloroform	Poison
74-87-3	Chloromethane (Methyl chloride)	Mildly toxic
107-30-2	Chloromethyl methyl ether	Poison
126-99-8	Chloroprene	Poison
1897-45-6	Chlorothalonil	Moderately toxic
7740-47-3	Chromium	Poison
7440-48-4	Cobalt	Poison
7440-50-8	Copper	Experimental tumorigen
120-71-8	p-Cresidine	Moderately toxic
1319-77-3	Cresol (mixed isomers)	Moderately toxic
108-39-4	m-Cresol	Poison
95-48-7	o-Cresol	Poison
106-44-5	p-Cresol	Poison
98-82-8	Cumene	Moderately toxic
80-15-9	Cumene hydroperoxide	Moderately toxic
135-20-6	Cupferron	Poison
110-82-7	Cyclohexane	Poison
94-75-7	2,4-D (Acetic acid,(2,4-dichlore-phenoxy))	Poison
1163-19-5	Decabromodiphenyl oxide	Experimental neoplastigen
2303-16-4	Diallate	Poison
615-05-4	2,4-Diaminoanisole	Poison
39156-41-7	2,4-Diaminoanisole sulfate	Poison
101-80-4	4,4-Diaminophenyl ether	Poison
25376-45-8	Diaminotoluane (mixed isomers)	Poison
95-80-7	2,4-Diaminotoluene	Poison
334-80-3	Diazomethane	Experimental tumorigen
132-64-9	Dibenzofuran	
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	Poison
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	Poison
84-74-2	Dibutyl phthalate	Moderately toxic
25321-22-6	Dichlorobenzene (mixed isomers)	Poison
95-50-1	1,2-Dichlorobenzene	Poison
541-73-1	1,3-Dichlorobenzene	Poison
106-46-7	1,4-Dichlorobenzene	Poison
91-94-1	3,3-Dichlorobenzidine	Experimental carcinogen
75-27-4	Dichlorobromomethane	Moderately toxic
107-06-2	1,2-Dichloroethane	Poison

CAS NUMBER	CHEMICAL NAME	HAZARDS
540-59-0	1,2-Dichloroethylene	Poison
75-09-2	Dichloromethane (Methylene chloride)	Poison
120-83-2	2,4-Dichlorophenol	Poison
78-87-5	1,2-Dichloropropane	Moderately toxic
542-75-6	1,3-Dichloropropylene	Poison
62-73-7	Dichlorvos	Poison
115-32-2	Dicofol	Poison
1464-53-5	Diepoxybutane	Poison
111-42-2	Diethanolamine	Moderately toxic
117-81-7	di-(2-ethylhexyl) phthalate (DEHP)	Poison
84-66-2	Diethyl phthalate	Poison
64-67-5	Diethyl sulfate	Poison
119-90-4	3,3-Dimethoxybenzidine	Moderately toxic
60-11-7	4-Dimethylaminoazobenzene	Poison
119-93-7	3,3-Dimethylbenzidine (o-Tolidine)	Poison
79-44-7	Dimethylcarbamyl chloride	Poison
57-14-7	1,1-Dimethyl hydrazine	Poison
105-67-9	2,4-Dimethylphenol	Poison
131-11-3	Dimethyl phthalate	Moderately toxic
77-78-1	Dimethyl sulfate	Poison
534-52-1	4,6-Dinitro-o-cresol	Poison
51-28-5	2,4-Dinitrophenol	Deadly poison
121-14-2	2,4-Dinitrotoluene	Poison
606-20-2	2,5-Dinitrotoluene	Moderately toxic
117-84-0	n-Dioctyl phthalate	Mildly toxic
123-91-1	1,4-Dioxane	Poison
122-66-7	1,2-Diphenylhydrazine (Hydrazobenzene)	Poison
106-89-8	Epichlorohydrin	Poison
110-80-5	2-Ethoxyethanol	Moderately toxic
140-88-5	Ethyl acrylate	Poison
100-41-4	Ethylbenzene	Moderately toxic
541-41-3	Ethyl chloroformate	Poison
74-85-1	Ethylene	Simple asphyxiant
107-21-1	Ethylene glycol	Poison
151-56-4	Ethyleneimine (Aziridine)	Poison
75-21-8	Ethylene oxide	Poison
96-45-7	Ethylene thiourea	Poison
2164-17-2	Fluometuron	Poison
50-00-0	Formaldehyde	Poison
76-13-1	Freon 113	Mildly toxic
76-44-8	Heptachlor (1,4,5,6,7,8,8,-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene)	Poison
118-74-1	Hexachlorobenzene	Poison
87-68-3	Hexachloro-1,3-butadiene	Poison
77-47-4	Hexachlorocyclopentadiene	Deadly poison
67-72-1	Hexachloroethane	Poison
13355-87-1	Hexachloronaphthalene	Poison
680-31-9	Hexamethylphosphoramide	Experimental carcinogen
302-01-2	Hydrazine	Poison
10034-93-2	Hydrazine sulfate	Poison
7647-01-0	Hydrochloric acid	Poison
74-90-8	Hydrogen cyanide	Deadly poison
7664-39-3	Hydrogen fluoride	Poison
123-31-9	Hydroquinone	Poison
78-84-2	Isobutyraldehyde	Moderately toxic
67-63-0	Isopropyl alcohol	Poison
80-05-7	4,4-Isopropylidenediphenol	Poison
7439-92-1	Lead	Poison
58-89-9	Lindene	Poison
108-31-6	Maleic acid	Poison
12427-38-2	Maneb	Experimental carcinogen
7439-96-5	Manganese	Experimental tumorigen
108-78-1	Melamine	Experimental carcinogen

CAS NUMBER	CHEMICAL NAME	HAZARDS
7439-97-6	Mercury	Poison
67-56-1	Methanol	Poison
72-43-5	Methoxychlor (Benzene-1,1-(2,2,2,-trichloroethylidene)bis(4-methoxy)	Moderately toxic
109-86-4	2-Methoxyethanol	Moderately toxic
96-33-3	Methyl acrylate	Poison
1634-04-4	Methyl tert-butyl ether	Flammable
101-14-4	4,4-Methylenebis(2-chloro aniline)	Poison
101-61-1	4,4-Methylenebis (N,N-dimethyl)benzenamine	Moderately toxic
101-68-8	Methylenebis(phenylisocyanate)	Poison
74-95-3	Methylene bromide	Poison
101-77-9	4,4-Methylenedianiline	Poison
78-93-3	Methyl ethyl ketone	Moderately toxic
60-34-4	Methyl hydrazine	Poison
74-88-4	Methyl iodide	Poison
108-10-1	Methyl isobutyl ketone	Poison
624-83-9	Methyl isocyanate	Poison
80-62-6	Mehtyl methacrylate	Moderately toxic
90-94-8	Michler's ketone	Poison
1313-27-5	Molybdenum trioxide	Poison
505-60-2	Mustard gas	Poison
91-20-3	Naphthalene	Poison
134-32-7	alpha-Naphthylamine	Poison
91-59-8	beta-Naphthylamine	Poison
7440-02-0	Nickel	Poison
7697-37-2	Nitric acid	Poison
139-13-9	Nitrilotriacetic acid	Poison
99-59-2	5-Nitro-o-anisidine	Moderately toxic
98-95-3	Nitrobenzene	Poison
92-93-3	4-Nitrobephenyl	Poison
1836-75-5	Nitrofen	Poison
51-75-2	Nitrogen mustard	Deadly poison
55-63-0	Nitroglycerin	Poison
88-75-5	2-Nitrophenol	Poison
100-02-7	4-Nitrophenol	Poison
79-46-9	2-Nitropropane	Poison
156-10-5	p-Nitrosodiphenylamine	Poison
121-69-7	N,N,-Dimethylaniline	Poison
924-16-3	N-Nitrosodi-n-butylamine	Moderately toxic
55-18-5	N-Nitrosodiethylamine	Poison
62-75-9	N-Nitrosodimethylamine	Poison
86-30-6	N-Nitrosodiohenylamine	Moderately toxic
621-64-7	N-Nitrosodi-n-propylamine	Moderately toxic
4549-40-0	N-Nitrosomethylvinylamine	Poison
59-89-2	N-Nitrosomorpholine	Poison
759-73-9	N-Nitroso-N-ethylurea	Poison
684-93-5	N-Nitroso-N-methylurea	Poison
16543-55-8	N-Nitrosonorrnicotine	Experimental carcinogen
100-75-4	N-Nitrosopiperidine	Poison
2234-13-1	Octachloronaphthlene	Poison
20816-12-0	Osmiun tetroxide	Poison
56-38-2	Parathion	Deadly poison
87-86-5	Pentachlorophenol	Poison
79-21-0	Peracetic acid	Poison
108-95-2	Phenol	Poison
106-50-3	p-Phenylenediamine	Poison
90-43-7	2-Phenylphenol	Poison
75-44-5	Phosgene	Poison
7664-38-2	Phosphoric acid	Poison
7723-14-0	Phosphorus	Poison
85-44-9	Phthalic anhydride	Poison
88-89-1	Picric acid	Poison

CAS NUMBER	CHEMICAL NAME	HAZARDS
1336-36-3	Polychlorinated biphenyls (PCBs)	Moderately toxic
1120-71-4	Propane sultone	Poison
57-57-8	beta-Propiolactone	Poison
123-38-6	Propionaldehyde	Moderately toxic
114-26-1	Propoxur	Poison
115-07-1	Propylene (propene)	Simple asphyxiant
75-55-8	Propyleneimine	Poison
75-56-9	Propylene oxide	Poison
110-86-1	Pyridine	Poison
91-22-5	Quinoline	Poison
106-51-4	Quinone	Poison
82-68-8	Quintozene (Pentachloronitrobenzene)	Experimental carcinogen
81-07-2	Saccharin	Moderately toxic
94-59-7	Safrole	Poison
7782-49-2	Selenium	Poison
7440-22-4	Silver	Experimental tumorigen
1310-73-2	Sodium hydroxide (solution)	Poison
7757-82-6	Sodium sulfate (solution)	Moderately toxic
100-42-5	Styrene	Experimental poison
96-09-3	Styrene oxide	Moderately toxic
7664-93-9	Sulfuric acid	Poison
100-21-0	Terephthalic acid	Moderately toxic
79-34-5	1,1,2,2,-Tetrachloroethane	Poison
127-18-4	Tetrachloroethylene	Experimental poison
961-11-5	Tetrachlorovinphos	Poison
7440-28-0	Thallium	Poison
62-55-5	Thioacetamide	Poison
139-65-1	4,4-Thiodianiline	Poison
62-56-6	Thiourea	Poison
1314-20-1	Thorium dioxide	Carcinogen
7550-45-0	Titanium tetrachloride	Poison
108-88-3	Toluene	Poison
584-84-9	Toulene-2,4-diisocyanate	Poison
91-08-7	Toluene-2,6-diisocyanate	Poison
95-53-4	o-Toluidine	Poison
636-21-5	o-Toluidine hydrochloride	Poison
8001-35-2	Toxaphene	Poison
68-76-8	Triaziquone	Poison
52-68-6	Trichlorfon (Phosphoric acid (2,2,2-trichloro-1-hydroxyethyl)-dimethyl ester	Poison
120-82-1	1,2,4-Trichlorobenzene	Poison
71-55-6	1,1,1-Trichloroethane (methyl chloroform)	Poison
79-00-5	1,1,2-Trichloroethane	Poison
79-01-6	Trichloroethylene	Experimental poison
95-95-4	2,4,5-Trichlorophenol	Poison
88-06-2	2,4,6-Trichlorophenol	Poison
1582-09-8	Trifluralin	Moderately toxic
95-63-6	1,2,4-Trimethylbenzene	Moderately toxic
126-72-7	Tris(2,3-dibromopropyl) phosphate	Poison
51-79-6	Urethane (Ethyl carbamate)	Moderately toxic
7440-62-2	Vanadium (fume or dust)	Poison
108-05-4	Vinyl acetate	Moderately toxic
593-60-2	Vinyl bromide	Moderately toxic
75-01-4	Vinyl chloride	Poison
75-35-4	Vinylidene chloride	Poison
1330-20-7	Xylene (mixed isomers)	Moderately toxic
108-38-3	m-Xylene	Moderately toxic
95-47-6	o-Xylene	Moderately toxic
106-42-3	p-Xylene	Moderately toxic
87-62-7	2,6-Xylidine	Moderately toxic
7440-66-6	Zinc (fume or dust)	Skin & systemic irritant
12122-67-7	Zineb	Moderately toxic